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Japan Report

No. 150

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FY-82 ENERGY-RELATED BUDGET DRAFT PRESENTED

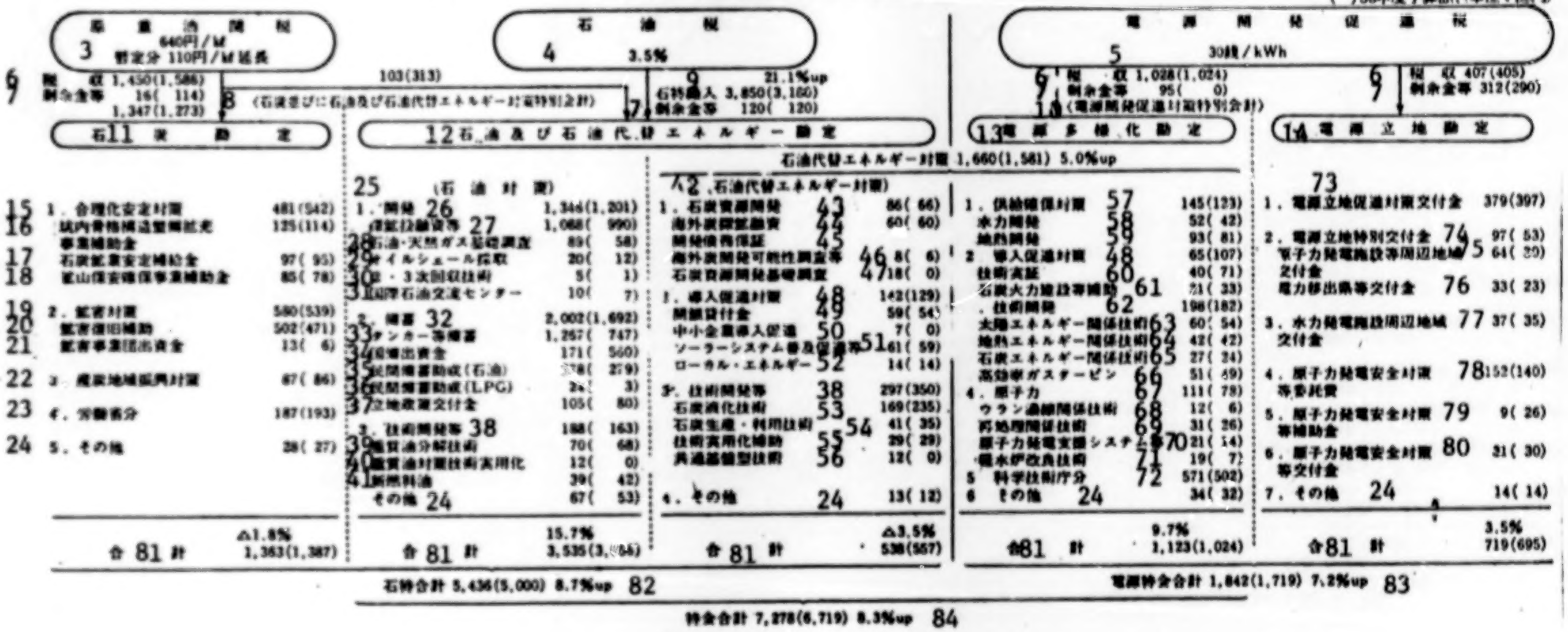
Tokyo ENERUGI FORAMU in Japanese Feb 82 pp 117-120

[Text] Reviewing the government's budget draft for FY-82, the energy-related budget has the highest rate of increase among general expenditures. Although oil supply and demand are in equilibrium for the time being, the structure of our energy insecurity has not been greatly improved. Rather, the possibility is great that difficult new problems, such as the tendency among OPEC countries to form interest-based groups and economic instability in the developing nations along the sea lanes, will greatly shake the world in the next several years. In response to this situation, the budget draft reflects the concern for general security. Under tight financial restraints, this budget draft can be evaluated as a modulated budget distribution. As a measure to prepare for energy insecurity, emphasis is placed on augmenting oil stockpiles. However, emphasis should be placed on more positive budgetary measures such as solving the economic insecurity of related countries through economic cooperation.

Although we have already obtained a national consensus concerning non-oil energy, many items are problematic when subjected to item-by-item review. The failure of SRC-II, a coal liquefaction project, has brought into relief the difficulty of new energy development that depends on new technology. Carrying logic to an extreme, non-oil measures are a technological policy, an industrial policy of applying technology created by the technological policy, and furthermore of international cooperation to diffuse the technology throughout the world.

1 エネルギー関係特別会計予算総括表

2 （　）56年度予算額，（単位：億円）



石油代替エネルギー対策 1,660(1,581) 5.0%up

石炭勘定 11	
15 1．合理化安定対策	481(542)
16 坑内骨格構造整備拡充事業補助金	125(114)
17 石炭鉱業安定補給金	97(95)
18 鉱山保安確保事業補助金	85(78)
19 2．鉱害対策	580(539)
20 鉱害復旧補助	502(471)
21 鉱害事業団出資金	13(6)
22 3．産炭地域振興対策	67(86)
23 4．労働省分	187(193)
24 5．その他	28(27)
合 81 計	△1.8% 1,363(1,387)

25 （石油対策）	
1．開発 26	1,346(1,201)
探鉱投融資等 27	1,068(990)
28 石油・天然ガス基礎調査	89(58)
29 オイルシェール採取	20(12)
30 2・3次回収技術	5(1)
31 国際石油交流センター	10(7)
2．備蓄 32	2,002(1,692)
33 タンカー等備蓄	1,257(747)
34 備蓄出資金	171(560)
35 民間備蓄助成（石油）	378(279)
36 民間備蓄助成（LPG）	24(3)
37 立地政策交付金	105(80)
3．技術開発等 38	188(163)
39 重質油分解技術	70(68)
40 重質油対策技術実用化	12(0)
41 新燃料油	39(42)
その他 24	67(53)
合 81 計	15.7% 3,535(3,[illegible])

42 （石油代替エネルギー対策）	
1．石炭資源開発 43	86(66)
海外炭探鉱融資 44	60(60)
開発債務保証 45	
海外炭開発可能性調査等 46	8(6)
石炭資源開発基礎調査 47	18(0)
2．導入促進対策 48	142(129)
開銀貸付金 49	59(54)
中小企業導入促進 50	7(0)
ソーラーシステム普及促進等 51	61(59)
ローカル・エネルギー 52	14(14)
3．技術開発等 38	297(350)
石炭液化技術 53	169(235)
石炭生産・利用技術 54	41(35)
技術実用化補助 55	29(29)
共通基盤型技術 56	12(0)
4．その他 24	13(12)
合 81 計	△3.5% 538(557)

電源多様化勘定 13	
1．供給確保対策 57	145(123)
水力開発 58	52(42)
地熱開発 59	93(81)
2 導入促進対策 48	65(107)
技術実証 60	40(71)
石炭火力建設等補助 61	21(33)
3．技術開発 62	198(182)
太陽エネルギー関係技術 63	60(54)
地熱エネルギー関係技術 64	42(42)
石炭エネルギー関係技術 65	27(24)
高効率ガスタービン 66	51(49)
4．原子力 67	111(78)
ウラン濃縮関係技術 68	12(6)
再処理関係技術 69	31(26)
原子力発電支援システム等 70	21(14)
軽水炉改良技術 71	19(7)
5 科学技術庁分 72	571(502)
6 その他 24	34(32)
合 81 計	9.7% 1,123(1,024)

電源立地勘定 14　73	
1．電源立地促進対策交付金	379(397)
2．電源立地特別交付金 74	97(53)
原子力発電施設等周辺地域交付金 75	64(30)
電力移出県等交付金 76	33(23)
3．水力発電施設周辺地域交付金 77	37(35)
4．原子力発電安全対策等委託費 78	152(140)
5．原子力発電安全対策等補助金 79	9(26)
6．原子力発電安全対策等交付金 80	21(30)
7．その他 24	14(14)
合 81 計	3.5% 719(695)

石特合計 5,436(5,000) 8.7%up 82

電源特会合計 1,842(1,719) 7.2%up 83

特会合計 7,278(6,719) 8.3%up 84

[Key on following page]

Key:

(1) Summary of Energy-Related Special Account Budgets (2) Amount of FY-81 budget given in parentheses, (unit: 100 million yen) (3) Crude Petroleum Customs Duty--640 yen/kl; the provisional portion of 110 yen/kl is to be extended (4) Petroleum Tax (5) Tax for Promotion of Electric Power Source Development--0.3 yen/kWh (6) Tax Revenue (7) Carried Over Surplus, etc (8) (Coal Mining Industry Special Account and Petroleum and Petroleum Substitute Energy Special Account) (9) Transfer to Coal Mining Industry and Petroleum and Petroleum Substitute Energy Special Accounts (10) Special Account for Promotion of Electric Power Source Development (11) Coal Account (12) Petroleum and Petroleum Substitute Energy Account (13) Electric Power Source Diversification Account (14) Electric Power Source Siting Account (15) Rationalization and Safety Measures (16) Subsidy for Pit Frame Structure Expansion and Improvement Projects (17) Supplementary Allowance for Stabilization of the Coal Mining Industry (18) Subsidy to Projects for Maintaining Mine Safety (19) Mining Pollution Measures (20) Assistance to Restoration of Mining-Damaged Environments (21) Investment in the Mine Damage Corporation (22) Coal Mine Area Rehabilitation Measures (23) Portion in the Labor Ministry's Budget (24) Others (25) (Petroleum Measures) (26) Development (27) Investments and Loans for Exploration, etc (28) Petroleum and Natural Gas Primary Surveys (29) Oil Shale Extraction (30) Secondary and Tertiary Recovery Technology (31) International Petroleum Exchange Center (32) Stockpiles (33) Tanker and Other Stockpiles (34) Funding for Government Stockpiles (35) Assistance for Private Stockpiles (Petroleum) (36) Assistance for Private Stockpiles (LPG) (37) Siting Policy Grants (38) Technological Development, etc (39) Heavy Oil Cracking Technology (40) Practical Application of Heavy Oil Processing Technology (41) New Fuel Oils (42) Petroleum Substitute Energy Measures (43) Coal Resources Development (44) Loans for Overseas Coal Exploration (45) Loan Guarantees for Development (46) Foreign Coal Development Feasibility Studies (47) Coal Resources Development Basic Survey (48) Measures To Promote Introduction [of Substitute Energy] (49) Japan Development Bank Loans (50) Promotion of the Introduction [of Substitute Energy] in Small and Medium-Size Businesses (51) Diffusion and Promotion of Solar Systems (52) Local Energy (53) Coal Liquefaction Technology (54) Coal Production and Utilization Technology (55) Assistance for Practical Applications of Technology (56) Jointly Applied Technology (57) Measures to Secure Supply (58) Hydroelectric Power Development (59) Geothermal Development (60) Verification of Technology (61) Assistance for Construction of Coal-Burning Power Plants, etc (62) Technological Development (63) Solar Energy-Related Technology (64) Geothermal Energy-Related Technology (65) Coal Energy-Related Technology (66) High-Efficiency Gas Turbines (67) Nuclear Power (68) Uranium Enrichment-Related Technology (69) Reprocessing-Related Technology (70) Nuclear Power Plant Support Systems, etc (71) Light Water Reactor Modification Technology (72) Portion in the Science and Technology Agency's Budget (73) Grants for Promotion of Electric Power Source Siting (74) Special Grants for Electric Power Source Siting (75) Grants to Areas Around Nuclear Power Plant Facilities, etc (76) Grants to Electric Power Exporting Prefectures, etc (77) Grants to Areas around Hydroelectric Power Plant Facilities (78) Funds for Commissioning Nuclear Power Plant Safety Measures, etc (79) Subsidies for Nuclear Power Plant Safety Measures, etc (80) Grants for Nuclear Power Plant Safety Measures, etc (81) Total (82) Total of Coal Mining Industry and Petroleum and Petroleum Substitute Energy Special Accounts (83) Total of Electric Power Source Special Account (84) Total of Energy-Related Special Accounts

1
石炭対策（石炭勘定）

2 （単位：百万円）

3 事 項	4 56年度予算額	5 57年度予定額	6 増(△)減額	7 備 考
8 I 石炭鉱業合理化安定対策費	54,223	48,066	△6,157	(56 FY → 57 FY) 32
9 炭鉱整理促進に必要な経費	298	1,422	1,124	
10 石炭鉱業生産体制改善対策に必要な経費	12,127	13,051	924	・坑内骨格構造整備拡充事業費補助金 33 114億円→125億円
11 新エネルギー総合開発機構出資に必要な経費	6,539	0	△6,539	・57FYは新機構が政保付市中借入(65億円) 34
12 石炭鉱業経理改善対策に必要な経費	18,418	19,757	1,339	・安定補給交付金一単価変更が認められた 35 露天掘 350円／トン→0円／トン 坑内掘 ↗1,150（急傾斜） 石狩地区 600→ 650（その他） その他地区 450→ 250
13 石炭需要確保対策に必要な経費	6,356	2,242	△4,114	
14 石炭鉱業保安確保対策に必要な経費	9,775	10,637	862	・鉱山保安確保事業費補助金 78億円→85億円 36
15 新エネルギー総合開発機構に対する補給金に必要な経費	710	957	247	
16 II 鉱 害 対 策 費	53,949	58,045	4,096	
17 鉱害復旧事業に必要な経費	47,821	50,964	2,873	・鉱害復旧事業資金補助金 471億円→502億円 37
18 石炭鉱害事業団事務費等に必要な経費	4,620	5,000	389	
19 石炭鉱害事業団出資に必要な経費	600	1,280	680	・条件改訂が認められた 38 融資比率 70%又は80%→85% 償還期間（うち据置期間） 8年（3年）→15年（4年）
20 石炭鉱害事業団に対する補給金等に必要な経費	145	122	△ 23	
21 無資力鉱害の調整に必要な経費	763	670	△ 123	
22 III 産炭地域振興対策費	8,603	8,667	64	
23 産炭地域振興対策に必要な経費	6,198	6,495	297	・産炭地域振興臨時交付金のうち 39 特定事業促進調整額 11億円→12.5億円
24 地域振興整備公団出資に必要な経費	1,050	1,050	0	
25 地域振興整備公団に対する補給金等に必要な経費	1,354	1,122	△ 232	
26 （通商産業省所管政策費計）	116,775	114,778	△1,997	
27 IV 炭鉱離職者援護対策費	9,110	8,319	△ 791	
28 V 産炭地域開発雇用対策費	10,165	10,384	219	
29 （労働省所管計）	19,275	18,703	△ 572	
30 VI 事務処理費等	2,696	2,769	73	
31 石 炭 勘 定 合 計	138,745	136,250	△2,495	

Key:

(1) Coal Measures (Coal Account) (2) (unit: million yen) (3) Item (4) Amount in FY-81 budget (5) Proposed amount in FY-82 budget (6) Amount of increase, △ indicates amount of decrease (7) Remarks (8) Funds for Rationalization and Stabilization of the Coal Mining Industry (9) Funds for Promotion of Mine Closures (10) Funds for Improvement of Production Systems in the Coal Mining Industry (11) Funds for the New Energy Development Organization (12) Funds for Financial Improvement of the Coal Mining Industry (13) Funds To Maintain Coal Demand (14) Funds To Maintain Mine Safety (15) Funds To Subsidize the New Energy Development Organization (16) Mining Pollution Measures Expenses (17) Funds for Restoration of Environments Polluted by Mining (18) Funds for Clerical Expenses of the Coal-Mine Damage Corporation, etc (19) Funds to Finance the Coal-Mine Damage Corporation (20) Funds to Subsidize the Coal-Mine Damage Corporation (21) Funds for Adjustment of Mining Pollution Caused by Insolvent Parties (22) Funds for Measures To Promote Coal-Producing Regions (23) Funds for Measures To Promote Coal-Producing Regions (24) Funds To Finance Japan Regional Development Corporation (25) Funds To Subsidize the Japan Regional Development Corporation, etc (26) (Total of All Funds for Policies under the Jurisdiction of MITI) (27) Funds To Aid Unemployed Coal Miners (28) Funds for Development and Employment Measures in Coal-Producing Regions (29) (Total of All Funds for Policies under the Jurisdiction of the Ministry of Labor) (30) Funds for Clerical Work Processing (31) Total of the Coal Account (32) (FY-81 → FY-82) (33) Subsidy for Expansion and Improvement of Pit Frame Structures, 11.4 billion yen → 12.5 billion

[Key continued on following page]

yen (34) In FY-82 the New Energy Development Organization is authorized government guarantees of 6.8 billion yen in loans from commercial financing institutions (35) As for Grants for Stable Supply, a change in the unit cost was approved: in the case of strip mining, from 350 yen per ton to 0 yen; in the case of pit mining, from 600 yen per ton to 1,500 yen (steep slopes) and to 650 yen (for others) in Ishikari region, and from 450 yen per ton to 250 yen in other regions (36) Subsidies for Projects To Maintain Mine Safety, 7.8 billion yen → 8.5 billion yen (37) Subsidies for Restoration of Environments Polluted by Mining (38) Revision of conditions was approved: the loan ratio--70 or 80 percent → 85 percent; the redemotion period (period of deferment in parentheses)--8 years (3 years) → 15 years (4 years). (39) Of Provisional Grants for Promotion of Coal Producing Regions, the Adjustment for Promotion of Certain Projects: 1.1 billion yen → 1 25 billion yen

1石油対策(石油及び石油代替エネルギー勘定) 2（単位：百万円）

3 事　項		4 56年度予算額	5 57年度予定額	6 増(△)減額	7 備　考
8 1 [illegible]		120,123	134,571	14,448	
9 [illegible]		99,000	108,800	9,800	[illegible] 35
10 [illegible]		5,796	8,890	3,094	[illegible] 36
11 [illegible]		1,246	1,956	710	[illegible] 37
12 [illegible]		147	528	381	[illegible] 38
13 [illegible]		669	1,045	376	[illegible] 39
14 [illegible]		3,102	2,802	300	[illegible] 40
15 [illegible]		2,168	2,564	396	[illegible] 41
16 [illegible]		1,016	1,336	290	[illegible] 42
17 [illegible]		3,396	3,990	594	
18 そ の 他		3,583	2,690	△ 893	
19 2 [illegible]		169,174	200,176	31,002	
20 [illegible]		74,732	126,738	52,006	[illegible] 43
21 [illegible]		56,000	17,100	△38,900	[illegible] 44
22 [illegible]	23 (石油分)	29,096	31,259	2,163	[illegible] 45
	24 (LPG分)	102	329	227	[illegible] 46
25 [illegible]	23 (石油分)	0	5,160	5,160	[illegible] 47
	24 (LPG分)	0	1,600	1,600	LPG 〃 〃 48
26 [illegible]		8,019	10,549	2,530	[illegible] 49
18 そ の 他		1,225	7,441	6,216	
27 3 [illegible]		16,303	18,776	2,473	
28 [illegible]		5,704	3,986	△ 1,718	[illegible] 50
29 [illegible]		1,135	2,990	1,864	[illegible] 51
30 [illegible]		0	1,223	1,223	[illegible] 52
31 [illegible]		0	149	149	[illegible] 53
32 [illegible]		4,182	3,899	△ 283	[illegible] 54
33 [illegible]		118	209	91	[illegible] 55
18 そ の 他		5,164	6,311	1,147	
34 石 油 対 策 合 計		305,600	353,524	47,924	

Key:

(1) Petroleum Measures (Petroleum and Petroleum Substitute Energy Account) (2) (unit: million yen) (3) Item (4) Amount in FY-81 budget (5) Proposed amount in FY-82 budget (6) Amount of increase, △ indicates the amount of decrease

[Key continued on following page]

(7) Remarks (8) Development and Acquisition of Petroleum (9) Loans and Investments for Exploration, etc (Funding Japan Petroleum Development Corporation) (10) Basic Surveys for Petroleum and Natural Gas (11) Research and Study on Oil Shale Development Technology (12) Secondary and Tertiary Recovery Technology (13) Oil Refining Technology Projects and so forth for Oil-Producing Countries (International Petroleum Exchange Center) (14) Overseas Geological Structure Surveys, etc (15) Subsidies for Natural Gas Exploration (16) Research and Development of Oil Resource Remote-Sensing Technology (17) Research and Development of Seabed Oil-Producing Systems (18) Other (19) Increase in Oil Stockpiles (20) Grants and Supplementary Allowances for Enterprises Engaged in Tanker Stockpiling, etc (21) Investments in Japan Petroleum Development Corporation's Oil Stockpiling Business (22) Supplementary Allowances for Oil and Petroleum Gas Stockpile Increases (Private Oil Stockpiles) (23) (Petroleum) (24) (LPG) (25) Investment in a Joint Oil and Petroleum Gas Stockpile Company (26) Grants for Oil Storage Facility Siting (27) Technological Development, Distribution, etc (28) Research and Development of Heavy Oil Processing Technology (29) Development of Utilization Technology for Residual Heavy Oils (30) Development of Practical Applications of Heavy Oil Processing Technology (31) Feasibility Study on Construction of a Joint Heavy Oil Processing Center (32) Research and Development of New Fuel Oils (33) Diffusion and Development of Petroleum Distribution Information (34) Total Cost of Petroleum Measures (35) The scale of projects for investments and loans is 140 billion yen (116 billion yen in FY-81) (36) Primary physical investigations and primary drilling on land and in the sea around Japan (2 wells in the sea and 1 well on land) (37) Research and study on oil shale extraction technology (experimentation with dry distillation technology and development of a plant) (38) Recovery technology and oil field evaluation (field study) (39) Project to train human resources of oil-producing countries in the areas of oil refining technology and market information (40) Geological structure surveys in foreign countries in order to adjust oil development bases in advance (41) Aid to natural gas exploration in Japan (real assistance ratio--50 percent) (42) Establishment of oil resource remote-sensing technology by means of a resource satellite (43) Load increase in government's oil stockpiles (September's loading 1.5 million kiloliter) (44) Construction of government stockpile station (scale of project--133.3 billion yen) (45) Interest supplement for loans taken out by the private sector in order to maintain a 90-day oil stockpile (46) Interest supplement for loans used to make purchases for the LPG stockpile (47) Investment in construction of a joint oil stockpiling base (48) Investment in construction of a joint LPG stockpiling base (49) Grants to improve public facilities in cities, towns, villages, and areas surrounding the sites of stockpiling facilities (50) Study of the operation of a pilot plant for heavy oil cracking (5-year plan starting in 1979) (51) Construction of a pilot plant to produce city gas and low-cost hydrogen from asphalt (52) Development of a practical plant for heavy oil cracking (10,000 B/D) (53) Feasibility study on a joint heavy oil processing center (2 domestic sites and 1 overseas site) (54) Technological development of synthetic fuel oil production, and the upgrading and refining of oil shale and oil sand, and biomass (7-year plan starting in 1980) (55) Diffusion and development of petroleum information for consumers

1 石油代替エネルギー対策(石油及び石油代替エネルギー勘定)　　2 (単位：百万円)

3 事項	4 56年度予算額	5 57年度予算案	6 増(△)減額	7 備考
8 1. 供給確保対策（石炭資源開発）	6,636	8,556	1,920	
9 ① 新機構海外炭探鉱等出資金	6,000	6,000	0	・探鉱融資、開発資金債務保証 34
10 ② 海外炭開発可能性調査費等補助金	636	752	116	・地質構造調査 35
11 ③ 石炭資源開発基礎調査費補助金	0	1,804	1,804	・石炭賦存量等調査 36 （海上物探＋海上試掘＋陸上試掘）
12 2. 導入促進対策	12,861	14,157	1,296	
13 (1) 日本開発銀行への貸付金	5,400	5,850	450	・石炭転換、コール・センター建設、ガス冷房普及促進等 37
14 (2) 中小企業における導入促進	0	684	684	・中小企業に対する利子補給及び技術研究補助 38
15 (3) ソーラーシステム普及促進	5,864	6,058	194	
16 ① ソーラーシステム普及促進対策費補助金	5,444	5,507	63	・公的施設設置補助、低利融資制度（民間住宅、事業用施設） 39
17 ② ソーラーシステム性能評価試験委託費	421	551	130	・総合太陽利用の性能試験装置 40
18 (4) ローカルエネルギーの開発利用促進	1,410	1,413	3	
19 ① 地域エネルギー開発利用モデル事業費補助事	1,210	910	△ 300	・事業化可能性調査、モデル事業補助 41
20 ② 地域エネルギー開発利用事業普及促進融資基金造成補助	0	503	503	・地方公共団体等によるローカルエネルギー利用事業に対する低利融資制度 42
21 (5) その他	187	152	△ 35	
22 3. 技術開発	35,048	29,676	△ 5,372	
23 (1) 石炭液化技術	23,541	16,891	△ 6,650	
24 ① 石炭液化技術研究開発費補助金	7,724	16,136	8,412	・豪州における褐炭液化 50t/日プラント建設等 43
25 ② 石炭液化技術研究開発委託費補助金	716	755	39	・EDS
26 ③ 石炭液化技術開発費分担金	15,010	0	△15,010	・SRC－II
27 (2) 共通基盤型石油代替エネルギー技術開発費補助金	0	1,231	1,231	・鉄鋼、フェロアロイ等エネルギー多消費業種における代替エネルギーの回収・効率的利用技術 44
28 (3) 石炭生産・利用技術振興費補助金	3,456	4,126	670	・石炭利用技術(流動床燃焼、COM、石炭ハンドリング技術等) 45 ・石炭生産技術(露天掘採掘機械等) 46
29 (4) 石炭ガス化技術開発費補助金	2,518	1,303	△ 1,215	・高カロリーガス化 47
30 (5) 石油代替エネルギー関係技術開発費補助金	2,900	2,900	0	・民間技術開発補助 48
21 (6) その他	2,633	3,225	592	
31 汎用スターリングエンジン開発費補助金	0	245	245	・外燃機関のための技術開発 49
32 4. 新機構交付金等	1,156	1,387	231	
33 石油代替エネルギー対策　合計	55,701	53,776	△ 1,925	

Key:

(1) Petroleum Substitute Energy Measures (Petroleum and Petroleum Substitute Energy Account) (2) (unit: million yen) (3) Item (4) Amount in FY-81 budget (5) Proposed amount in FY-82 budget (6) Amount of increase, △ indicates the amount of decrease (7) Remarks (8) Measures to Secure Supply (Coal Resources Development) (9) Investments in Overseas Coal Exploration by the New Energy Development Organization, etc (10) Subsidy for Feasibility Studies on Overseas Coal Development (11) Subsidy for Primary Surveys of Coal Resources Development (12) Measures To Promote Introduction [of Substitute Energy] (13) Japan Development Bank Loans (14) Promotion of Introduction [of Substitute Energy] in Small and Medium-Size Businesses (15) Diffusion and Promotion of Solar Systems (16) Subsidies for Diffusion and Promotion of Solar System Policy (17) Funds to Commission Performance Tests of Solar Systems (18) Promotion of Local Energy Development and Utilization (19) Assistance to Model Projects of Local Energy Development and Utilization (20) Aid To Establish a Loan Fund for Projects To Diffuse and Promote Local Energy Development and Utilization (21) Others (22) Technological Development (23) Coal Liquefaction Technology (24) Subsidies for Research and Development of Coal Liquefaction Technology (25) Subsidies for Research and Development of Coal Liquefaction Technology Projects (26) Allotment

[Key continued on following page]

for Expenses of Coal Liquefaction Technology Development (27) Subsidy for Development of Jointly Applied Petroleum Substitute Energy Technology (28) Subsidy for Promotion of Coal Production and Utilization Technology (29) Subsidy for Development of Coal Gasification Technology (30) Subsidy for Development of Oil Substitute Energy-Related Technology (31) Subsidy for Development of an All-Purpose Sterling Engine (32) Grants for the New Energy Development Organization, etc (33) Total Funds for Petroleum Substitute Energy Measures (34) Loan for exploration and loan guarantees for development capital (35) Geophysical structure surveys (36) Surveys of coal deposits, etc (sea exploration, sea drilling, and land drilling) (37) Promotion of conversion to coal, construction of a coal center, diffusion and promotion of gas air-conditioning, etc (38) Interest supplements to public financial institutions serving small and medium-size businesses and assistance to technological development (39) Assistance for installation [of solar systems] in public facilities and a low-interest loan system (private houses and business facilities) (40) Mock-up performance test equipment for solar utilization (41) Feasibility study of commercialization and assistance to model projects (42) A low-interest loan system by local government organizations, etc, for local energy utilization projects (43) Construction of a brown coal liquefaction plant (50 t/day) in Australia (44) Technology for recovery and efficient use of substitute energy in energy-intensive industries such as pulp and paper and ferroalloys (45) Coal utilization technology (fluidized bed combustion, COM, coal handling technology, etc) (46) Coal-producing technology (strip mining machines, etc) (47) High-calorie gasification (48) Assistance to technological development in the private sector (49) Technological development of external combustion engines

1 [illegible]　　2 （[illegible]）

	3 [illegible]	4 [illegible]	5 [illegible]	6 [illegible]	7 [illegible]
8	1 [illegible]	12,335	14,509	2,174	
9	(1) [illegible]	4,204	5,242	1,038	
10	① [illegible]	2,716	3,467	751	• [illegible] 35
11	② [illegible]	850	1,035	185	• [illegible] 36
12	③ その他	639	739	100	• [illegible] 37
13	(2) [illegible]	8,131	9,267	1,136	
14	① [illegible]	2,750	3,100	350	• [illegible] 38
15	② [illegible]	2,725	3,052	327	• [illegible] 39
16	③ [illegible]	2,600	3,060	460	• [illegible] 40
12	④ その他	55	56	1	
17	2 [illegible]	10,736	6,480	△ 4,256	
18	(1) [illegible]	10,437	6,086	△ 4,351	
19	① [illegible]	3,334	2,102	△ 1,232	• [illegible] 41
20	② [illegible]	7,103	3,984	△ 3,119	• [illegible] COM[illegible] 42
21	(2) [illegible]	299	394	95	• [illegible] 43
22	3 [illegible]	18,236	19,788	1,552	
23	(1) [illegible]	2,392	2,690	298	• [illegible] 44
24	(2) [illegible]	5,423	6,015	592	• [illegible] 45
25	(3) [illegible]	4,183	4,239	56	• [illegible] 46
26	(4) [illegible]	4,940	5,120	180	
12	(5) その他	1,298	1,725	425	• [illegible] 47
27	4 [illegible]	7,767	11,032	3,265	
28	(1) [illegible]	633	1,203	570	• [illegible] 48
29	(2) [illegible]	728	1,872	1,144	
30	(3) [illegible]	2,590	3,115	525	• [illegible] 49
31	(4) [illegible]	1,861	2,004	143	• [illegible] 50
32	(5) [illegible]	1,442	2,109	667	
12	(6) その他	503	740	237	
33	5 [illegible]	50,163	57,066	6,903	• [illegible] 51
12	6 そ の 他	3,173	3,399	226	[illegible] 52
	34 [illegible]	102,410	112,294	9,884	

[Key on following page]

(1) Electric Power Source Diversification Measures (Electric Power Source Diversification Account) (2) (unit: million yen) (3) Item (4) Amount in FY-81 budget (5) Proposed amount in FY-82 budget (6) Amount of increase, ▲ indicates the amount of decrease (7) Remarks (8) Measures to Secure Supplies (9) Hydroelectric Power Development (10) Subsidies for Development of Small and Medium-Size Hydroelectric Power Plants (11) Policymaking on Site Selection for Hydroelectric Power Development (12) Other (13) Geothermal Development (14) Surveys for Promotion of Geothermal Development (15) Assistance to Drilling for Geothermal Surveys (16) Environmental Assessment for Large-Scale Deep Underground Geothermal Development (17) Measures To Promote Introduction [of Substitute Energy] (18) Promotion of Substitute Energy Utilization (19) Assistance for Construction of Coal Burning Power Plants, etc (20) Actual Tests of Coal Burning Power-Related Technologies, etc (21) Promotion of Base Adjustment (22) Technological Development (23) Coal Energy (24) Solar Energy (25) Geothermal Energy (26) High-Efficiency Gas Turbines (27) Nuclear Power (28) Uranium Enrichment (29) Verification Tests of Light Water Reactor Modification Technology (30) Reprocessing-Related Technology (31) Modification of the Safety Analysis Code, etc (32) Nuclear Power Plant Support Systems, etc (33) Science and Technology Agency (34) Total of Electric Power Source Diversification Account (35) Publicly operated electric power businesses, etc (subsidy ratio--basically 5-15 percent, for some an additional 5 percent) (36) Surveys of topography, ground, and environment (37) Grants to the Electric Power Development Co, etc (38) Surveys of geothermal energy reserves and the environment (39) The number of wells, 25 → 28 (40) Hohi region (41) Okinawa and Ishikawa coal-burning power plants (assistance--30 percent) and an aluminum industry joint coal-burning power plant (assistance--15 percent) (42) Dry desulfurization, COM conversion, etc (43) Preparatory surveys for ash disposal center siting (44) Low-calorie gasification and high-performance coal thermal power (45) Solar heat electric generation and solar light electric generation (46) Nationwide comprehensive survey of geothermal resources and testing of geothermal exploration technology (47) Subsidies for development of new type batteries, fuel cells, and practical application of new electrical generating technology (48) Uranium enrichment by a chemical method, development of mass production technology for domestic centrifugal separators to be used in domestic uranium enrichment plants (49) Verification investigations of technology for the second reprocessing facility, etc (50) In-service nuclear power plant reactor safety analysis code and earthquake resistant safety analysis code (51) Refer to the Science and Technology Agency budget in a separate table (52) Grants to the New Energy Development Organization, etc

1 **電源立地対策(電源立地勘定)**

2 (単位：百万円)

3 事項	4 56年度予算額	5 57年度予定額	6 増(△)減額	7 備考
8 1 電源立地促進対策交付金	39,682	37,928	△1,754	・産業振興施設を使途として追加 25 ・一般水力発電施設に係る最低保証額の引上げ 26
9 2 電源立地特別交付金	5,327	9,717	4,390	
10 ① 原子力発電施設等周辺地域交付金	3,027	6,417	3,390	・平年度化
11 ② 電力移出県等交付金	2,300	3,300	1,000	電源地域における企業立地を促進するための金融 27 制度の整備を促進するため、交付金単価の5割増 28
12 3 水力発電施設周辺地域交付金	3,538	3,724	186	
13 4 原子力発電安全対策等委託費	14,037	15,223	1,186	
14 ① 電源立地推進広報対策等委託費	663	782	119	・原子力等電源立地に係るP.A.対策の強化 29 (原子力エイド、地域団体との連携の強化) エネルギーフロンティア計画推進 30
15 ② 原子力発電実証試験等委託費(通産省)	6,172	7,332	1,160	
16 ③ 〃 (科技庁)	4,487	4,089	△ 398	・別表の科技庁予算参照 31
17 ④ その他	2,715	3,020	305	
18 5 原子力発電安全対策等補助金	2,536	895	△1,643	
19 ① 原子力広報研修施設整備費補助金	385	385	0	
20 ② 重要電源等立地推進対策補助金	100	200	100	・重要電源等の関係自治体のP.A.活動助成 500万円/地点 32
17 ③ その他	2,053	310	△1,743	
21 6 原子力発電安全対策等交付金	2,995	3,069	74	
22 ① 放射能監視交付金	1,342	1,450	108	
23 ② 広報・安全等対策交付金	860	899	39	
17 ③ その他	793	720	△ 73	
17 7 その他	1,346	1,376	30	
24 電源立地勘定合計	69,463	71,932	2,469	

Key:

(1) Electric Power Sources Siting Measures (Electric Power Sources Siting Account) (2) (unit: million yen) (3) Item (4) Amount in FY-81 budget (5) Proposed amount in FY-82 budget (6) Amount of increase, △ indicates amount of decrease (7) Remarks (8) Grants for Electric Power Source Siting Promotional Measures (9) Special Grant for Electric Power Sources Siting (10) Grants to Areas Surrounding Nuclear Power Plant Facilities, etc (11) Grants to Electric Power Exporting Prefectures, etc (12) Grants to Areas Surrounding Hydroelectric Power Plant Facilities (13) Expenses for Commissioning Nuclear Power Plant Safety Measures, etc (14) Expenses for Commissioning Public Relations Measures To Promote Electric Power Sources Siting (15) Funds To Commission Proving Tests of Nuclear Power Plants, etc (MITI) (16) Funds To Commission Proving Tests of Nuclear Power Plants (Science and Technology Agency) (17) Other (18) Subsidies for Nuclear Power Plant Safety Measures, etc (19) Subsidies for Improvement and Expansion of Nuclear Power Public Relations Training Facilities (20) Subsidies for Promotional Measures of Important Electric Power Sources Siting, etc (21) Grants for Nuclear Power Plant Safety Measures, etc (22) Grants for Radiation Monitoring (23) Grants for Public Relations and Safety Measures (24) Total of the Electric Power Sources Siting Account (25) Supplement for use as industrial promotion facilities (26) Raised the minimum guaranteed amount in relation to general hydroelectric power plant facilities (27) Made the average fiscal year level (28) 50 percent increase of unit cost of grant to promote adjustment of financial systems for promoting industrial siting in electric power source areas (29) Strengthening the P. A. measures involving electric power plant siting such as nuclear power plant siting (strengthening nuclear power aid to and cooperation with regional organizations) (30) Promotion of the energy frontier plan (31) Refer to the Science and Technology Agency budget in a separate table (32) Assistance to P. A. activities of local governments related to important electric power sources--5 million yen per site.

1 （科技庁電源開発促進対策特別会計分）　2 （単位：百万円、(債)：国庫債務負担行為）

3 事項	4 前年度当初予算額	5 昭和57年度予算案	6 比較増△減額	7 備考	
8 （電源立地勘定）	9,379	9,758	379	104.0%	
9 1. 原子力発電安全対策等委託費	4,487	4,192	△295	19 大型再冠水効果実証試験等8課題	3,859
				20 原子力発電施設等緊急時対策技術調査	65
				21 核燃料サイクル広報対策	102
10 2. 電源立地促進対策交付金	2,378	2,181	△197		
11 3 電源立地特別交付金	680	1,468	788	22 原子力発電施設等周辺地域交付金	1,191
				23 電力移出県等交付金	277
12 4. 原子力発電安全対策等交付金	1,781	1,841	60	24 放射線監視交付金	1,450
				25 原子力発電施設等緊急時安全対策交付金	256
13 （電源多様化勘定）	(債)34,568 50,176	(債)7,211 57,080	(債)△27,357 6,904	113.8%	
14 1. 動力炉・核燃料開発事業団	(債)34,568 47,870	(債)7,211 53,806	(債)△27,357 5,936		
15 (1) 新型動力炉の開発	(債)28,637 23,440	(債)780 24,233	(債)△27,857 793	26 高速増殖炉原型炉「もんじゅ」の建設	14,954
				27 新型転換炉実証炉に関する研究開発	1,910
16 (2) 使用済燃料再処理技術の開発	(債)5,380 18,878	(債)6,901 24,080	(債)521 5,202	28 再処理技術開発	(債)2,321 8,093
				29 高レベル放射性廃棄物処理技術開発	4,003
				30 再処理施設の整備	(債)3,580 5,001
				31 硝酸プルトニウム転換施設の建設・運転	3,316
17 (3) ウラン濃縮技術の開発	(債)551 5,552	(債)530 5,493	(債)△21 △59	32 原型プラント調整設計等	(債)530 961
18 その他	2,306	3,274	968	33 化学法ウラン濃縮技術開発の助成	871
				34 放射性廃棄物処理技術開発の助成等	283
計	(債)34,568 59,555	(債)7,211 66,838	(債)△27,357 7,283	112.2%	

Key:

(1) (Science and Technology Agency Special Account for Electric Power Source Promotional Measures) (2) (unit: million yen; (債) indicates that the national treasury assumes liability) (3) Item (4) Initial budget amount in FY-81 (5) Budget draft in FY-82 (6) Comparative amount of increase, Δ indicates amount of decrease (7) Remarks (8) (Electric Power Source Siting Account) (9) Expenses To Commission Safety Measures for Nuclear Power Plants, etc (10) Grants for Electric Power Source Siting Promotional Measures (11) Special Grant for Electric Power Sources Siting (12) Grant for Nuclear Power Plant Safety Measures, etc (13) (Electric Power Source Diversification Account) (14) Power Reactor and Nuclear Fuel Development Corporation (15) Development of a New Power Reactor (16) Development of Used Fuel Reprocessing Technology (17) Development of Uranium Enrichment Technology (18) Other (19) Eight subjects including a verification test of the large-scale resubmergence effect (20) Research on emergency measures technology for nuclear power plants, etc (21) Public relations measures for the nuclear fuel cycle (22) Grants to Areas Surrounding Nuclear Power Plant Facilities, etc (23) Grants to Electric Power Exporting Prefectures, etc (24) Grants for radiation monitoring (25) Grants for emergency safety measures at nuclear power plants, etc (26) Construction of the prototype fast breeder reactor Monju (27) Research and development of a new demonstration converter reactor (28) Development of reprocessing technology (29) Development of high-level radioactive waste disposal technology (30) Improvement of reprocessing facilities (31) Construction and operation of a plutonium nitrate conversion facility (32) Adjustment and design of a prototype plant, etc (33) Assistance for development of uranium enrichment technology by a chemical method (34) Assistance for development of radioactive waste disposal technology, etc

1 科技庁一般会計エネルギー関連予算案　　2 (単位：百万円)

3 事項	4 昭和56年度 当初予算額	5 昭和57年度 予算案	6 比較増△減額	7 備考	
8 原子力開発利用の推進	(債)58,344 174,992	(債)61,780 176,200	(債)△ 6,584 1,208	100.7%	
9 (1) 原子力安全規制行政及び環境安全対策	2,187	2,131	△56	原子力安全委員会 14 放射性廃棄物処理処分対策 15 放射能測定調査研究 16 保障措置、核物質防護対策 17	268 221 1,038 501
10 (2) 動力炉・核燃料開発事業団	(債)12,611 78,032	(債)15,787 72,675	(債)3,176 △5,357	動力炉の開発 18 うち 19 高速増殖炉の開発 20 新型転換炉の開発 21 ウラン資源の海外調査探鉱 22 ウラン濃縮技術の開発 23	(債)15,787 48,995 (債)664 21,630 2,185 6,059 3,980
11 (3) 日本原子力研究所	(債)39,223 79,422	(債)34,780 84,601	(債)△4,443 5,179	安全性の研究 24 核融合の研究開発 25 うち 19 JT−60の建設 26 日米核融合協力 27 多目的高温ガス炉の研究開発 28	(債)3,429 8,060 (債)27,564 41,236 (債)25,214 34,569 3,042 (債)2,505 5,455
12 (4) 日本原子力船研究開発事業団	(債)5,500 6,856	7,197	(債)△5,500 341	新定係港の整備 29	3,783
13 (5) 放射線医学総合研究所	(債)1,010 5,039	5,851	(債)△1,010 812	内部被ばく実験棟の建設 30 低レベル放射線影響研究 31	2,091 314

Key:

(1) Energy-Related Budget Draft in the Science and Technology Agency General Account (2) (unit: million yen) (3) Item (4) Initial budget amount in FY-81 (5) Budget draft in FY-82 (6) Comparative amount of increase, Δ indicates amount of decrease (7) Remarks (8) Promotion of Nuclear Power Development and Utilization (9) Administration of Nuclear Power Safety Regulations and Environmental Safety Measures (10) Power Reactor and Nuclear Fuel Development Corporation (11) The Japan Atomic Energy Research Institute (12) The Japan Nuclear Ship Development Agency (13) National Institute of Radiological Sciences (14) Nuclear Safety Commission (15) Radioactive waste treatment and disposal measures (16) Radioactivity measurement surveys and studies (17) Compensation measure, nuclear substance protection measures (18) Development of reactors (19) Out of this (20) Development of a fast breeder reactor (21) Development of a new converter (22) Overseas surveys and exploration for uranium resources (23) Development of uranium enrichment technology (24) Studies on safety (25) Research and development of nuclear fusion (26) Construction of the JT-60 (27) Japan-U.S. Nuclear Fusion Cooperation (28) Research and development of a multipurpose high-temperature gas reactor (29) Improvement of a new designated mooring harbor (30) Construction of an internal exposure experiment house (31) Research on the influence of low-level radiation

9896
CSO: 4105/57

SCIENCE AND TECHNOLOGY

FIFTH GENERATION COMPUTER PROJECT OUTLINED

Tokyo TSUSAN JANARU in Japanese Mar 82 pp 35-41

[Article by Sosaburo Okamatsu, Machine Information Industry Bureau: "Review of the Fifth Generation Computer Research and Development Project"]

[Text] Outline of Policy

It is believed that with the advances in the computer oriented society, the need for easily used computers with a high degree of capabilities which can be used even without specialized information will increase. On the other hand, the increasing complexity and size of the software is becoming a problem in the computers up to now, and they will not always be able to respond to such needs.

The Ministry of International Trade and Industry believes that computer technology not only is the basic technology which supports many industries but is an important technology which is a must to fashion a society abundantly endowed with information, as a result of which it decided as of FY-82 to initiate research and development on the fifth generation computer, which is expected to become practical in the 1990's based on a new design concept.

The research and development period is expected to require about 10 years. As this will be a leading and innovative technological development, the first 3 years (FY 82-84) of the plan will be devoted to developing the basic technology of this fifth generation computer. The estimated budget required for these 3 years is 10 billion yen, including 423 million yen for FY-82, the first year of this research and development program, and plans for contractual development are expected.

Significance, Background of Research and Development

Society's Demand

The computer has not only taken over plants and offices but is invading our living area as well and has come to play the role of the "central nervous system of the economic society" which is the nerve center of this highly developed and complex society. On the other hand, when the prospects of the coming 10 years are reviewed, it can be expected that the social environment which envelops the computer will change greatly, and it is anticipated that a spectacular expansion in the utilization area will bring about new utilization states and require corresponding application technology. The roles expected for the computer systems for the 1990's include improving the productivity of low-productivity industries such as tertiary industries, minimizing energy costs, contributing to energy resources conservation through optimum control, contributing to the solution of social problems of a complex and varied nature such as treatment and training accompanying transition to an older society, and responding to the internationalization of society through international cooperation and automated translations.

In order to meet the social needs of the 1990's, at which time the active area of computers will be expected to cover an even wider range, it will become necessary to develop epoch-making computers which will allow free access to information in various forms, such as audio, writings, or figures, which man uses in his daily activity to transmit information and by which even a nonspecialist will be able to engage in conversation to extract the desired information.

Technological Background

Computers are classified according to the elements they use--first generation (vacuum tube), second generation (transistor), and third-fifth generation (LSI)--in which revolutionary technological developments have given rise to the successive generations. The present age is the fourth generation, in which VLSI is the mainstay. These computers are based on the theory set forth by von Neumann in 1946; since that time the search has continued for higher speed and greater capacity, and development has been mainly along the lines of numerical calculations. On the other hand, the von Neumann type computer at the time of its initial development required expensive hardware, and efforts were directed at simplifying the construction of the machines and then stacking up the programs to obtain the necessary functions in the line of attack that was followed. As a result, there were limitations to input and output accompanying the higher degree of utilization and expanding areas of application--gigantic software, greater complexity and low productivity--and limitations to computation and treatment speed because of the successive treatment mode, among the many problems which emerged.

In another direction, seed type elements of new technology development include research on dispersed systems and parallel treatment systems, VLSI technology which has seen rapid advances in the past few years, emergence of large volume memory and large volume utilization of VLSI, along with advances in research on element technology for artificial intelligence and pattern recognition technology. New architecture and improvement in computer intelligence are being made possible by approaches from various angles to add to the technology foundation.

When one considers these problem areas of present computers versus the social needs, the seed elements of new technology development, and the periods of computer technological change experienced in the past, the appearance of computers based on some new concept about the start of the 1990 decade seems to be absolutely necessary.

Policy Significance

The promotion of information is a subject of greatest importance if Japan is to continue to develop actively as an economic power in international society, aid in the conservation of resources and energy, and continue to develop an active and abundant society. Thus it becomes necessary to plan to establish and reinforce the various policies on information development, and the information industry which supports such a move, through so-called social base investment. In order to promote development in the information area, not only must the foundation be provided, but also a long-range viewpoint should be adopted and leading and innovative information-related technology, particularly development of computer technology, must be encouraged.

Computer technology is a fundamental technology which supports a large number of industries and a most important technology which influences the nation's future as a source of international competitive strength, and it is from this viewpoint that various foreign countries are devoting vast governmental investment to assist technological development and nurture the computer industry. On the other hand, where as 80 percent of the share of the world market is held by American computer makers, the total share of the Japanese computer makers is only 7 percent, and there is an unmistakable difference in the industrial strengths. Despite this situation, it has been this nation's aim to catch up in the matter of the technological gap with the Western countries, and it has finally managed to catch up in one section, VLSI technology. On the other hand, this improvement in technological strength in this country has been accompanied by a wary attitude on the part of the leading countries in the matter of furnishing leading technology, and this movement is expected to become even more intense in the future. Computer technology represents an area where rapid advances occur, and any neglect in effort is associated with the possibility of immediate decline from the ranks of the technology leading nations. Japan, which aspires to be a nation based on technology, must plan to improve its potential for independent and creative technological development and make contributions to the international scene through self-developed technology so that it can continue to develop as a leading nation in technology, and this has to be achieved through uninterrupted research and development.

It can be expected that all this will have great influence on future economy and society, and starting the research and development project on the fifth generation computer, which spans all leading and far-reaching technological area, before the rest of the world is an extremely significant undertaking.

Research and Development Subjects

The fifth generation computer will be a computer system directed toward intelligent information treatment, with capabilities to respond to the high level and diversified needs of society in the 1990's.

At present, man must carefully study the treatment method and order of operations beforehand and then construct a program which directs the computer operation in order to utilize the computer. On the other hand, if the computer is to become a true partner of man, it must be able to activate data (information accumulated on an intelligent base) which it has accumulated in the past so that it can handle commonsense operations without detailed instructions from man, put into effect automatic judgment capabilities (reasoning capabilities) and raise the intelligence level of the computer. At the same time, it should not be the case that man should serve the convenience of the computer or the machine, but the computer must acquire the capability to utilize the means of communication man uses in his daily activities, such as conversation (words), written communications, and figures (intelligent interface capability and automatic program synthesis capability) and thereby greatly improve man-machine communication.

Next, these capabilities have to be subjected to high-speed treatment within a practical time by some method which can draw out the full potential of VLSI. At the same time, these capabilities must be able to set up machine translation systems, which were very difficult to achieve by the technology of the past, as well as serve as consultation systems for various specialty areas.

Innovative new technological development covering a wide area of hardware, architecture (constituent mode) technology, and software technology are necessary for research and development on the fifth generation computer, and the following are some research and development subjects.

Problem Solving Logic System

The problem solving logic system is the heart of the treatment capability of the fifth generation computer, and this system determines the degree of intelligence of the computer as well as how much flexibility (versatility) can be achieved.

In order to acquire the capabilities to supplement the incomplete aspects of the problem presented, complete a model representation of the problem (have the computer understand the problem) and arrive at a solution to the problem (goal) exploiting the axiomatic and theorem type objective information accumulated in the system, research and development must be promoted on a system which : 1) reduces the method of solution and data to the same mode (format), to a "nuclear language" suitable for logic; 2) uses "problem-solving logic-use basic software" which makes equivalent substitutions (substitutes equivalent values or closest values); and 3) uses "parallel treatment type architecture of the dispersion control "type" which interfaces with nuclear language to conduct logic treatment (this must be parallel treatment) at high speed.

Knowledge Base (Knowledge Data Base) System

The knowledge base system also plays a central role in the treatment capabilities of the fifth generation computer along with the problem solving logic system. A knowledge base is an accumulation of information in organized form similar to man's knowledge or, in other words, an intelligence bank.

Up to now, computers have utilized programs adapted to the problem at hand, and the information used in this solution only had to be relevant to the particular problem.

On the other hand, in order to search out relevant data or to understand the problem at hand and seek out a method of solution, there is need to store "knowledge" which is not an assembly of data, as was the case in the past, but in a form that activates the meaning and utility of the information.

In order to make practical this knowledge base system, research and development is necessary on: 1) "knowledge presentation language" suitable for multidimensional knowledge presentation and acquisition of new knowledge, 2) "basic software for knowledge base control use" to accumulate and search for knowledge, and 3) "knowledge base mechanism" based on a multidimensional memory mode with structural memory in place of the one-dimensional memory mode.

The contents of the knowledge base differ with the area of application. For example, it is likely that vocabulary and grammar type data will be stored in the knowledge base of a machine translation system. And a knowledge data base for a specialized area such as medicine will probably consist of data entered into the computer by specialists in the field.

Intelligent Interface System

The fifth generation computer system will be provided with flexibility in conversational capability so that it can resolve the gap between man and computer arising from differences in the language used. Research and development is necessary along the following lines: 1) "intelligent interface control basic software" with the capabilities of natural word treatment, continuous sound discrimination, and figure and picture treatment; and 2) an "intelligent interface mechanism" comprised of a special use processor to treat sound and signals along with "high-capability man-machine interface equipment" with the ability to deal with high-level sound, figures, and pictures in order to keep pace with the higher capabilities of machines in order to make practical these capabilities.

Intelligent Programming System

Research and development is required on a system which can extract a program which fits the user's needs from an algorithm bank (knowledge base) and employ logic to synthesize a program and then readily determine whether the synthesized program best fits the user's needs.

Basic Applied System

This is the foundation for the various applied systems, and there is a need for research and development on basic applied systems which represent human functions, such as hearing, speaking, seeing, writing, thinking and problem solving, and then demonstrate that the fifth generation computer can adequately perform these functions.

Some specific candidate subjects include a "machine translation system" between various foreign languages, including a definition information treatment function and a "consultation system" which stores specialty information in some given field in the information base system and provides the appropriate information to the user on demand as well as conferring with the user.

Research and Development Plan and Promotion System

Roughly 10 years are thought to be needed for research and development on the fifth generation computer, which will embody innovative logic and technology differing from computers of the past, and this research and development system can be classified into the following three phases.

The first phase is the initial 3-year period (FY 82-84), which will be the period in which "basic technological development" on the hardware, architecture, and software for the fifth generation computer will be conducted.

The second phase will be the next 4 years (FY 85-88), during which small-scale "subsystem development" of the logic mechanism and the knowledge base mechanism will take place based on the results of the first phase. This is the phase in which the two mechanisms which will become the backbone of the fifth generation computer will be completed separately.

The third phase will be the final 3 years (FY 89-91), during which the results of research and development on the logic mechanism and information base mechanism and the results of research and development on software will be combined and "total system development" will be conducted. It is after this stage is attained that a fifth generation computer prototype will be used for test production of a basic applied system, and the performance and capability will be demonstrated.

The preceding is the type of research and development plan that is envisioned. Next is a list of the major research and development plan features of the first phase.

1. There will be design and test production of the constituent elements of the logic mechanism and knowledge base mechanism which will become the backbone of the fifth generation computer in the form of basic mechanism modules for logic and knowledge and modules for different functional mechanisms such as data flow.

2. A model system will be drawn up which ties together the various constituent elements of the modules according to different functional mechanisms. Design and fabrication of a simulator for operating experiments to reassess the structure of the various constituent elements and their coupling mode will be carried out.

3. Design and test fabrication will be performed of the basic software system which will serve as the backbone of the intelligent information processing system. This may well be called the operating system of the fifth generation computer and will incorporate software modules for problem solving, logic, intelligent base control, intelligent interface, and intelligent programming.

4. Design and test production of a pilot model (small-scale pilot model of serial control logic computer) for software development will be carried out which will enable efficient development of software for the fifth generation computer and represent a partial modification of the von Neumann type architecture of the past, with language selected and modified for logic use.

5. An architecture which fully exploits the potential of VLSI is one of the goals of the fifth generation computer. To this end, the development of a technology which makes possible efficient VLSI design will be started in the second year.

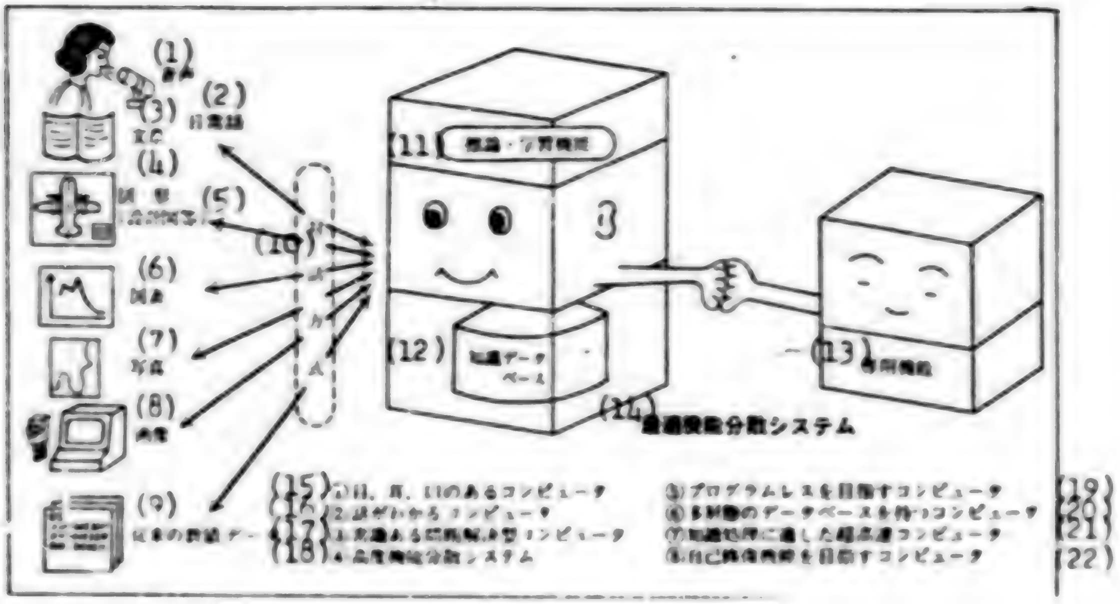
The promotion system for research and development on the fifth generation computer will be selected after careful consideration of the project's nature; the following are some of the principal points.

1. The fifth generation computer research and development, unlike technological develoment of the past which has been targeted along the lines of technology already developed in other countries, is a leading and innovative technological development which Japan proposes to promote in advance of other countries. As a result, the most advanced technology in the broad area of information related technology is necessary. At the same time, adequate evaluations are required at every phase of development while the developmental targets for the next phase are established. For this purpose it is desirable to have a flexible research and development system befitting a new generation in which universities, government-related research organs, makers, and users will participate in the areas in which they can best contribute.

2. The fifth generation computer research and development is attracting the attention of foreign countries as an important subject for the future; there were representatives from 14 countries, including the United States, the United Kingdom, France, and West Germany, at the "International Conference on the Fifth Generation Computer" sponsored by this country in October last year, and about 100 researchers from universities and technologists from computer industries participated. At the same time, the governments of the Western countries along with their industries are displaying great interest in this research and development.

The fifth generation computer is a most advanced technology and involves research and development covering a wide area; it may be considered a project which should be promoted on the basis of an international cooperative effort to which this country makes an international contribution. The international cooperative effort can assume a number forms, but research and development for the first 3 years of basic technological development will require extremely close relationships between the various themes, and a cooperative state in which any country or industry with interest of its own promotes independent research and development and makes periodic information exchange on its results comes to mind.

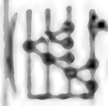
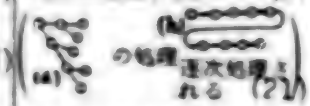
Utilization Image of Fifth Generation Computer



Key:

1. Voice
2. Daily language
3. Documents
4. Figures
5. (Plans, etc)
6. Tables
7. Photographs
8. Pictures
9. Numerical data of the past
10. Conversational mode
11. Logic, learning capability
12. Knowledge data base
13. Special capability
14. Optimum function dispersion system
15. Computer with eyes, ears, and mouth
16. Computer which understands words
17. Computer with common sense for problem solving
18. High-level capability dispersed system
19. Computer aimed at programless operation
20. Computer with multistate data base
21. Super high speed computer for knowledge treatment
22. Computer aimed at self-correcting capability

Features of the Fifth Generation Computer

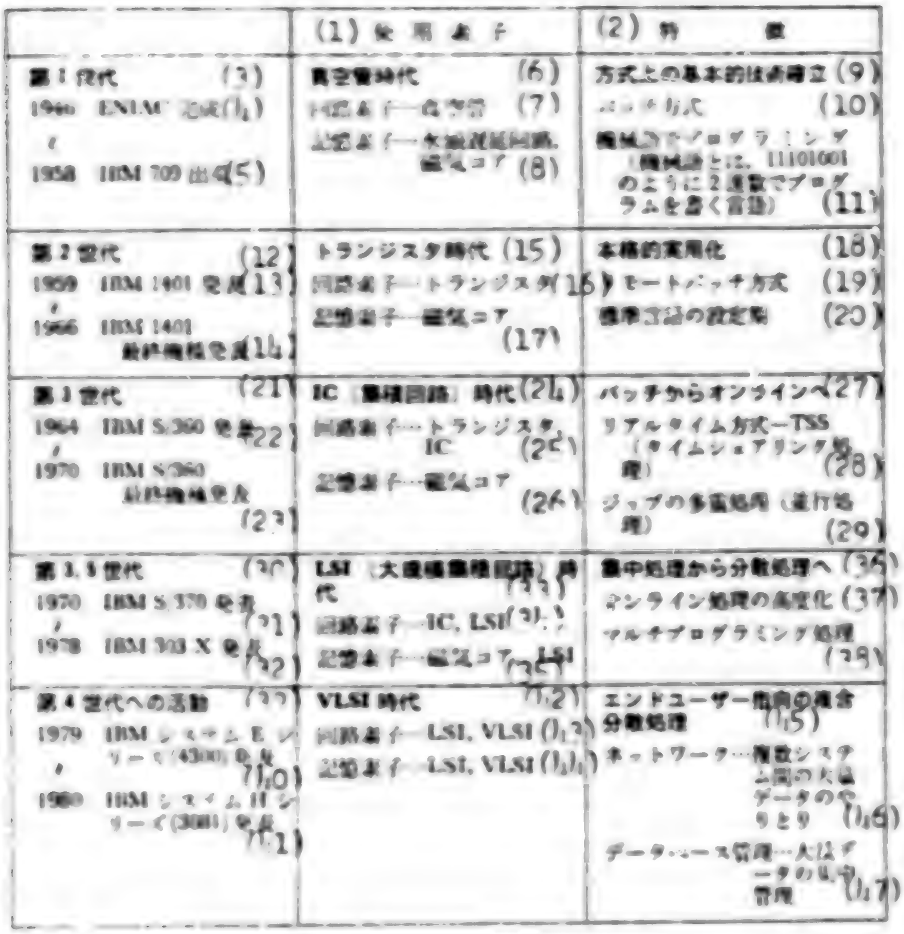
(1) 能力	(2) 第5世代コンピュータ	(3) 従来のコンピュータ	(4) 人間
(5) 記憶 (6) (7) (8)	○情報を他の情報と関連をもたせながら記憶する。(6) ○消去命令のない限り情報は消えない。(7) ○多様なメディアに対応した記憶方式 (8)	○単なる個別の情報として記憶する。(9) ○消去命令のない限り情報は消えない (10) ○数値情報中心の記憶方式 (11)	○周囲の状況や前後の事象と関連して記憶されることが多い。(12) ○いったん記憶しても忘れることがある。(13) ○情景、動作、音など多様な記憶 (14)
(15) 計算（処理）	○優れた演算能力を持つ。(16) ○並列処理が可能 (17)  (a) の段階ごとに並列処理される。(18)	○優れた演算能力を持つ。(19) ○逐次に処理する。(20)  (a) の処理 (b) 逐次処理される (21)	○計算能力は低い。(22)
(23) 創造力 適応能力 (24)	○常識機構により、最低必要な常識程度は持ち合わせている。(24) ○与えられた内容を理解して動作する [illegible] ときに問い直す)。(25) ○適応能力あり。(26)	○創造力なし（指示されたとおり [illegible] にしか動作しない）(27) ○適応能力はほとんどない。(28)	○豊富な創造力がある（1を聞いて、10を知る）。(29) ○適応能力に富む。(30)
(31) 判断能力	○[illegible] 情報の [illegible] により、音声、文字、図形・画像の認識機能が高い。(32) ○推論が可能。(33)	○部分的かつ低レベルな認識は可能。第六感はない。(34)	○視覚、聴覚、嗅覚、味覚、触覚の五感と、第六感（直感）を持つ。(35)

Key:
1. Capability
2. Fifth generation computer
3. Computer of the past
4. Human
5. Memory
6. Information is recorded while it is being related to other information
7. Information is not deleted as long as there is no erasure command
8. Memory mode which can adjust to various media
9. Stores information simply as separate entity
10. Information is not deleted as long as there is no erasure command
11. Memory mode centered on numerical information
12. Information frequently stored in line with surrounding situation and related events
13. Possibility of loss of memory after storage
14. Can remember scenes, actions, sound
15. Calculation (treatment)
16. Has superior computational power
17. Can be used in parallel treatment
18. Parallel treatment is made at each (a) step
19. Has superior computational power
20. Performs successive treatment
21. Treatment of (a), successive treatment of (b)
22. Low computational power
23. Creative power, application power
24. Is held to minimum necessary commonsense level by logic mechanism

Key continued:

25. Understands and uses indicated contents (asks questions when instructions are unclear)
26. Has adaptive powers
27. No creative power (will operate exactly as told, even when instructions are wrong)
28. Essentially devoid of adaptive power
29. Has abundant creative power (will hear 1 and know 10)
30. Has ample adaptive power
31. Judgment ability
32. Recognition technology advances for voice, documents, figures, and pictures by activation of pattern information
33. Logic is possible
34. Localized and low level recognition is possible, no sixth sense
35. Possesses sight, hearing, smell, taste, and feel and a sixth sense (direct feeling)

Trends in Computer Development



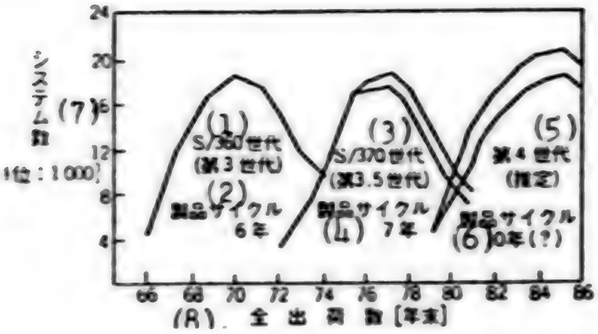
	(1) 使用素子	(2) 特徴
第1世代 (3) 1946 ENIAC 完成(4) 〜 1958 IBM 709 出現(5)	真空管時代 (6) 回路素子—真空管 (7) 記憶素子—水銀遅延回路、磁気コア (8)	方式上の基本的技術確立 (9) バッチ方式 (10) 機械語でプログラミング（機械語とは、11101001のように2進数でプログラムを書く言語）(11)
第2世代 (12) 1959 IBM 1401 発表(13) 〜 1966 IBM 1401 最終機種発表(14)	トランジスタ時代 (15) 回路素子—トランジスタ (16) 記憶素子—磁気コア (17)	本格的実用化 (18) リモートバッチ方式 (19) 標準言語の設定期 (20)
第3世代 (21) 1964 IBM S/360 発表(22) 〜 1970 IBM S/360 最終機種発表 (23)	IC（集積回路）時代 (24) 回路素子—トランジスタ、IC (25) 記憶素子—磁気コア (26)	バッチからオンラインへ (27) リアルタイム方式—TSS（タイムシェアリング処理）(28) ジョブの多重処理（並行処理）(29)
第3.5世代 (30) 1970 IBM S/370 発表 (31) 〜 1978 IBM 303X 発表 (32)	LSI（大規模集積回路）時代 (33) 回路素子—IC, LSI (34) 記憶素子—磁気コア、LSI (35)	集中処理から分散処理へ (36) オンライン処理の高度化 (37) マルチプログラミング処理 (38)
第4世代への活動 (39) 1979 IBM システムEシリーズ(4300)発表 (40) 〜 1980 IBM システムHシリーズ(3081)発表 (41)	VLSI時代 (42) 回路素子—LSI, VLSI (43) 記憶素子—LSI, VLSI (44)	エンドユーザー指向の複合分散処理 (45) ネットワーク…複数システム間の大量データのやりとり (46) データベース管理…大量データの集中管理 (47)

Key:
1. Element used
2. Features
3. First generation
4. 1946 ENIAC completed
5. 1958 IBM 709 appears
6. Vacuum tube age
7. Circuit element: vacuum tube
8. Memory element: mercury delay circuit, magnetic core
9. Establishment of basic technology in method
10. Batch method
11. Programming with machine language (machine language is one using binary system such as 11101-111)
12. Second generation
13. 1959 IBM 1401 announcement
14. 1966 last IBM 1401 machine announcement
15. Transistor age
16. Circuit element: transistor
17. Memory element: magnetic core
18. Actual practicalization
19. Remote batch mode
20. Established period for standard language
21. Third generation
22. 1964 announcement of IBM S/360
23. 1970 announcement of final IBM S/360 machine
24. IC (integrated circuit) age

Key continued:

25. Circuit element: transistor, IC
26. Memory element: magnetic core
27. From batch to on-line
28. Real time model-TSS (time sharing treatment)
29. Multiple job treatment (parallel treatment)
30. 3.5th generation
31. 1970 IBM announced IBM S/370
32. 1978 IBM announced 303 X
33. LSI (large scale integrated circuit age
34. Circuit element: IC, LSI
35. Memory element: magnetic core, LSI
36. From condensed treatment to dispersed treatment
37. High level on-line treatment
38. Multiprogramming treatment
39. Activation of Fourth generation
40. 1979 IBM system E series (4300) announced
41. 1980 IBM system H series (3081) announced
42. VLSI age
43. Circuit element: LSI, VLSI
44. Memory element: LSI, VLSI
45. Combination dispersion treatment of end user's directions
46. Network: large volume data interchange between several systems
47. Data base control: condensed control of large volume of data

Changes in Successive Generations of IBM Products



Source: ACT Technology Analysis Group

Key:

1. S/360 age (Third generation)
2. 6 years product cycle
3. S/370 age (3.5th generation)
4. 7 year product cycle
5. Fourth generation (estimated)
6. 10 year (?) product cycle
7. Number of systems [Unit: 1,000]
8. Total shipments [end of year]

2267
CSO: 4106/74

RESEARCH EFFORT STEPPED UP ON RESIDUAL OIL PROCESSING

Tokyo JAPAN PETROLEUM & ENERGY WEEKLY in English Vol 17, No 11, 15 Mar 82 pp 1-2

[Text] Japan's government-industry effort to develop residual oil processing entered final stages of the initial four-year plan (fiscal 1979-1982) on March 11, when a 100-barrel-per-day hydrocracking pilot plant went onstream at Ichihara, Chiba Pref. The pilot plant has been under construction since January 1981, at the site of Idemitsu Kosan's Central Research Laboratory, at an estimated total cost of ¥2,300 million ($9.8 million). The design for the 100-barrel-per-day pilot plant was based on the operating results of a 3-barrel-per-day bench plant completed in fiscal 1980.

Prior to the completion of the foregoing hydrocracking pilot plant, a 250-barrel-per-day fluid catalytic cracking pilot plant was completed in November 1981 at Nippon Mining's Mizushima Refinery, Okayama Pref. With these two pilot plants going onstream, Japan's R&D on residual oil processing has taken an epoch-making stride toward its final stages.

In an attempt to cope with the trend of Japan's crude oil imports moving toward a heavier mix while domestic oil consumption patterns shift toward an increasingly lighter product mix, an inter-industry R&D association, called the Research Association for Residual Oil Processing (RAROP), was established on June 18, 1979. The association comprises 14 petroleum refining companies, seven iron & steel companies, five engineering & heavy industry companies, Osaka Gas, and the Central Research Institute of Electric Power Industry (representing nine major electric utilities), with the support of the government--the Natural Resources & Energy Agency of the Ministry of International Trade and Industry (MITI). Mr. Teruo Noguchi, president of Koa Oil Co., is chairman of the association.

Japan's official approach to residual oil processing dates back to March 1978, when MITI organized a forum (chaired by Toshiwo Doko, then president of the Japan Federation of Economic Organizations) as a private advisory body to the MITI minister.

The forum published an interim report in July 1978 and a final report in March 1979, which served as a basis for establishing RAROP. According to these reports, intermediary measures -- such as relaxation of specifications for middle distillate products, improvement of operating conditions at existing facilities, coupled with switchover of direct burning at thermal power plants from a light crude to heavier fuel oil and/or coal -- will probably suffice through 1985 to meet the anticipated trends for a heavier crude mix/lighter product mix. But beginning around 1990, the introduction of cracking processes to convert residual oil to lighter, more valuable products on a large scale will become an absolute necessity.

The originally estimated capital expenditure totaling ¥18,000 million to implement the RAROP's four-year plan has been revised upward to ¥25,000 million ($106 million), with the government providing subsidies to finance 75 percent. Meanwhile, a new four-year plan (fiscal 1981-1984) was launched in fiscal 1981 to conduct R&D on manufacturing high-calorific gas and high-purity hydrogen gas from vacuum residua at an estimated total capital expenditure of ¥11,000 million ($46.8 million).

RAROP's five major R & D programs and participating members are as follows:

(1) Development of fluid catalytic cracking process

- Technology to maximize middle distillate production (Participating companies: Nippon Mining, Kashima Oil, Hitachi)
- Technology to crack residual oil of high metal content (Mitsubishi Oil)
- Catalytic cracking in general (Nippon Oil)

(2) Development of a hydrocracking process

- Hydrocracking in general (Idemitsu Kosan)
- R&D on catalyst (Maruzen Oil, Daikyo Oil, Asia Oil)

(3) Development of technologies for utilization of low-quality vacuum residua in the iron & steel industry

- Production of coke and injection into a blast furnace (Nippon Kokan, Kobe Steel, Nippon Steel Corp., Sumitomo Metal Industries, Nisshin Steel)
- Production of reduced iron pellets (Kobe Steel, Koa Oil, Idemitsu Kosan)
- Production of binder (Kawasaki Heavy Industries, Kawasaki Steel, Kawatetsu Chemical, Shell Sekiyu)

(4) Development of pitch, coke, asphalt, etc. combustion technologies, which include flue gas desulfurization, nitrogen oxides removal, dust and soot collection technologies

(Central Research Institute of Electric Power Industry, Mitsubishi Heavy Industries, Hitachi, Ishikawajima-Harima Heavy Industries, 14 oil firms)

(5) Development of technologies for utilization of vacuum residua

- Production of high-calorific gas (Osaka Gas*)

- Production of high-purity hydrogen gas (Toyo Engineering*)

(*) Joined RAROP in fiscal 1981.

CSO: 4120/219

BRIEFS

NEW PLASTIC OPTICAL FIBER--Tokyo, April 7 (KYODO)--Scientists have developed a new plastic optical fiber which is much more efficient than those already in existence and which can be produced at a fraction of the cost of glass fibers, the Nippon Telegraph and Telephone Public Corporation (NTT) announced Wednesday. The secret of the new fiber's success is the combining of carbon with deuterium in manufacture. Existing plastic fibers are made of a mixture of carbon and hydrogen. NTT expects optical fibers--hair-sized filaments capable of transmitting messages on beams of light--to be the mainstay of its communications network in the 21st century, because they transmit faster than current systems and can bear a greater load. The new plastic fiber can transmit light up to 1.3 kilometers, compared to under 100 meters for the older type. In addition, the loss of light is much smaller. It costs just Yen 10-20 to produce one meter of the new fiber, about 10 percent of the cost for glass fibers. The latter, however, can transmit over distances of up to 30 kilometers. [Text] [OW071233 Tokyo KYODO in English 1200 GMT 7 Apr 82]

CSO: 4120/221

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April 29, 1982